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FOREST PRODUCTS RESEARCH IN PICTURES

NO. 31

DRAWING SHOWS STRUCTURE OF HARDWOOD

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FOREST PRODUCTS LABORATORY
U. S. FOREST SERVICE
MADISON, WISCONSIN

This drawing of the cell structure of a minute block of hardwood was made in the course of studies of the physical properties of wood at the Forest Products Laboratory. Although the microscope cannot bring several planes into sharp focus at the same time, as this drawing does, it was by means of studies of various thin sections with the microscope that the drawing was accomplished. The block shown here was less than ¼ inch high.

Wood, instead of being a relatively solid material, is seen to be composed of many conducting tubes and fiber units cemented together. The larger tubes are specialized cells which serve to conduct the sap. The fibers serve primarily to give strength to the material.

The top surface TT of the block corresponds to the top surface of a stump or to the end surface of a log. The larger openings V on this surface are sap-conducting vessels, or pores, built up of short cylindrical cells joined to one another at the ends. The presence of these pores, which in many species are visible without the aid of a lens, helps to distinguish a hardwood from a softwood, the latter being made up of smaller cells of fairly uniform size. The pores are usually larger and more numerous in the springwood S or wood formed early in the growing season, than they are in the summerwood SM which has more of the smaller wood fibers F. Together, the springwood and the summerwood cells make up the annual ring AR. One such ring is added to the outside of the tree each year.

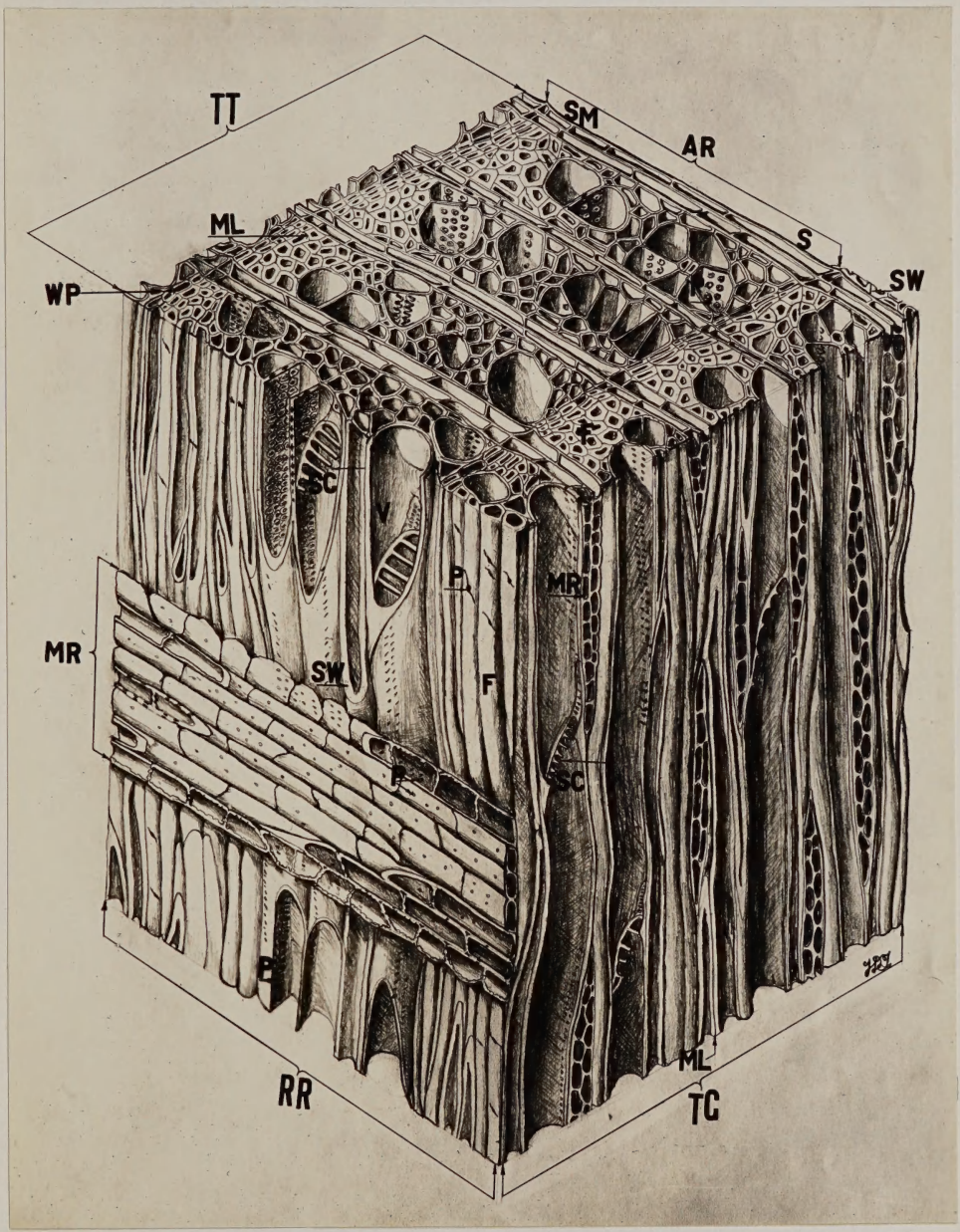
The left side surface RR represents a vertical plane along the radius of the trunk. The grating-like splices SC of the pore units are shown on this surface, as well as the pits P through which sap may pass from cell to cell. The medullary ray MR is one of many chains of short cells which radiate from the center of the tree and serve to store food material and to distribute it horizontally.

The surface RR is called "quarter-sawed" in hardwoods. The attractive figure of large lustrous flakes, made by medullary rays entering and leaving the plane of the saw, causes some quarter-sawed hardwoods such as oak and sycamore to be highly esteemed as furniture woods.

SW is the secondary wall, a thickening or deposition laid down by the living cell. ML is the middle lamella, a cementing substance between the cells.

The surface TG at right angles to the quarter-sawed surface, corresponds to the flat grain or plain-sawed surface of lumber.

(Photograph by Forest Products Laboratory, U. S. Forest Service)


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